UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,108	01/20/2004	Alexander T. Schwarm	008019 USA/MTCG/PCTRL/JW	6943

7590 04/29/2005

Patent Counsel MS/2061
Legal Affairs Department
Applied Materials, Inc.
P.O. Box 450A
Santa Clara, CA 95052

EXAMINER	
JARRETT, RYAN A	
ART UNIT	**PAPER NUMBER**
2125	

DATE MAILED: 04/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/759,108	SCHWARM, ALEXANDER T.	
	Examiner	Art Unit	
	Ryan A. Jarrett	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 18-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6-13, 16, 19-26, and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldman et al. US 2002/0128805 in view of Lebel et al. U.S. Patent No. 6,334,807.

Goldman discloses a method of automation performed on a semiconductor manufacturing tool, comprising the acts of: (a) automatically running a set of designed experiments on the tool (e.g., [0071]-[0083]); (b) collecting data resulting from running the experiments (e.g., [0083]); (c) scaling the collected data to make the collected data a linear function of thickness, temperature, or pressure (e.g., [0068], [0085], [0086], Table 4); (d) creating a model based on the scaled collected data (e.g., [0084]-[0089]); and (e) using the model to control the tool (e.g., [0090]-[0091]);

the method of claim 1, wherein act (b) is performed automatically (e.g., [0083]);

the method of claim 1, wherein act (c) is performed automatically (e.g., [0084]-[0089]);

the method of claim 1, further including automatically creating the set of designed experiments for the tool (e.g., [0071]-[0082]);

the method of claim 1, further including at least one of: importing data collected by running at least one experiment on an external system; and importing data collected during at least one previously run experiment (e.g., [0119]);

the method of claim 6, further including: automatically creating a model based on the imported data and user input (e.g., [0084]-[0089], [0120]);

the method of claim 6, further including: automatically creating a model based on the, collected data, the imported data and user input (e.g., [0084]-[0089], [0120]);

the method of claim 1, further including: allowing a user to interactively select one or more parameters to be adjusted between the experiments of the designed set of experiments and select one or more set of data to be collected (e.g., [0071]-[0082]);

the method of claim 9, further including: automatically generating the design set of experiments based on the user selected parameters and set of data to be collected (e.g., [0071]-[0082]);

the method of claim 1, further including: collecting the data based on a wafer-by-wafer basis (e.g., [0092]-[0099]);

the method of claim 1, wherein the tool is a tool for "sharpening" a wafer, such as a tool for removing an outer oxide layer from the wafer (e.g., [0093]).

A method of automation performed on a tool to manufacture devices, comprising the acts of: (a) automatically creating a set of designed experiments (e.g., [0071]-[0082]); (b) automatically running the set of designed experiments on the tool (e.g., [0083]); (c) automatically collecting data resulting from running the experiments (e.g., [0083]), wherein the data are collected on a wafer-by-wafer basis (e.g., [0092]-[0099]);

(d) scaling the collected data to make the collected data a linear function of thickness, temperature, or pressure (e.g., [0068], [0085], [0086], Table 4); (e) automatically creating a model based on the scaled collected data (e.g., [0084]-[0089]); and (f) using the model to control the tool (e.g., [0090]-[0091]).

A method of automation performed on a tool to manufacture devices, comprising the acts of: (a) automatically running a set of designed experiments on the tool (e.g., [0071]-[0083]; (b) automatically collecting data resulting from running the experiments (e.g., [0083]); (c) scaling the collected data to make the collected data a linear function of thickness, temperature, or pressure (e.g., [0068], [0085], [0086], Table 4); (d) creating a model based on the scaled collected data and imported data (e.g., [0084]-[0089]); and (e) using the model to control the tool (e.g., [0090]-[0091]).

A system of automating a semiconductor manufacturing tool, comprising: (a) a DOE system configured to automatically create a designed set of experiments for the tool (e.g., [0071]-[0082]) and to scale the collected data to make the collected data a linear function of thickness, temperature, or pressure (e.g., [0068], [0085], [0086], Table 4); (b) a controller configured to automatically run the created set of experiments on the tool and collect data resulting from running the experiments (e.g., [0083]); and (c) a modeling environment configured to create a model based on the scaled collected data (e.g., [0084]-[0089]), wherein the controller is further configured to control the tool based on the created model (e.g., [0090]-[0091]), and wherein the DOE system, controller and modeling environment are integrated with each other (e.g., [0071]-[0091]);

the system of claim 16, wherein the DOE system is further configured to create automatically the set of designed experiments for the tool (e.g., [0071]-[0082]);

the system of claim 16, wherein the DOE system is further configured to import at least one of data collected by running at least one experiment on an external system and data collected during at least one previously run experiment (e.g., [0119]);

the system of claim 19, wherein the DOE system is further configured to create a model based on the imported data and user input (e.g., [0084]-[0089], [0120]);

the system of claim 19, wherein the DOE system is further configured to create a model based on the scaled collected data, the imported data, and user input (e.g., [0084]-[0089], [0120]);

the system of claim 16, wherein the DOE system is further configured to allow a user to interactively select one or more parameters to be adjusted between the experiments of the designed set of experiments and select one or more set of data to be collected (e.g., [0071]-[0082]);

the system of claim 22, wherein the DOE system is furthered configured to generate automatically the design set of experiments based on the user selected parameters and set of data to be collected (e.g., [0071]-[0082]);

the system of claim 16, wherein the controller is further configured to collect the data on a wafer-by-wafer basis (e.g., [0092]-[0099]).

A computer readable medium for storing instructions being executed by one or more computers, the instructions directing the one or more computers for automatically generating design of experiment, the instructions comprising implementation of the acts

of: (a) automatically running a set of designed experiments on the tool (e.g., [0071]-[0083]); (b) automatically collecting data resulting from running the experiments (e.g., [0083]); (c) scaling the collected data to make the collected data a linear function of thickness, temperature, or pressure (e.g., [0068], [0085], [0086], Table 4); (d) creating a model based on the scaled collected data (e.g., [0084]-[0089]); and (e) using the model to control the tool (e.g., [0090]-[0091]);

the medium of claim 25, further including the instructions for implementing the act of: automatically creating the set of designed experiments for the tool (e.g., [0071]-[0083]);

the medium of claim 25, further including the instructions for implementing at least one act of: importing data collected by running at least one experiment on an external system; and importing data collected during at least one previously run experiment (e.g., [0119]);

the medium of claim 25, further comprising the instructions for implementing the act of: automatically creating a model based on the imported data and user input (e.g., [0084]-[0089], [0120]);

the medium of claim 25, further including the instructions for implementing the act of: automatically creating a model based on user input, the collected data and the imported data (e.g., [0084]-[0089], [0120]);

the medium of claim 25, further including the instructions for implementing the act of allowing a user to interactively select one or more parameters to be adjusted between

the experiments of the designed set of experiments and select one or more set of data to be collected (e.g., [0071]-[0083]);

the medium of claim 31, further including the instructions for implementing the act of: automatically generating the design set of experiments based on the user selected parameters and set of data to be collected (e.g., [0071]-[0083]);

the medium of claim 25, further including the instructions for implementing the act of: collecting the data based on a wafer-by-wafer basis (e.g., [0092]-[0099]).

Goldman et al. does not explicitly disclose that the scaled collected data (data "regression") is a linear function of time, i.e., that the inputs are "time-based" inputs. Goldman et al. discloses that the inputs to the wafer sharpening tool are inputs relating to thickness, pressure, and temperature. Goldman also does not explicitly disclose that the tool is a "chemical-mechanical-planarization tool", or a CMP tool. However, Goldman discloses that the tool is a tool for "sharpening" a wafer, such as a tool for removing an outer oxide layer from the wafer (e.g., [0093]). A CMP tool is considered to be an obvious variation of Goldman's "sharpening tool". Nevertheless, the secondary reference Lebel et al. specifically teaches a CMP tool. The only teaching really missing from Goldman is a teaching for inputting "time parameters" to control a wafer sharpening tool, or a CMP tool.

It is well known that wafer sharpening tools, or CMP tools, are controlled based on time inputs, in addition to the pressure and temperature inputs taught by Goldman.

For example, Lebel et al. discloses a CMP polishing in-situ endpoint system in which the correct polishing **time**, temperature, and pressure are determined for an experimental test batch of wafers (e.g., col. 1 lines 30-44). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Goldman et al. with Lebel et al. since Lebel et al. teaches that optimizing the time input to a CMP tool can prevent the wafers from being over-polished, thus preventing wafers from being scrapped (e.g., col. 1 lines 30-44).

3. Claims 5, 14, 15, 18, 27, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldman et al. in view of Lebel et al. as applied to claims 1, 13, 16, and 25 above, and further in view of Daft et al. US 2003/0154062.

Per claim 35, Goldman et al. in view of Lebel et al. discloses that the tool is a CMP tool as noted above, but does not appear to explicitly disclose importing one or more designed experiments from an external system. However, Daft discloses a system and method for statistical design of an ultrasound probe and imager system, and an associated graphical user interface for selecting input parameters to be used in an ultrasound simulation. The system comprises a DOE controller that can automatically import the DOE data and generate transfer functions from the simulation-based data (e.g., [0046]). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Goldman et al. in view of Lebel et al. with Daft et al. in order to make the system of Goldman et al. in view of

Lebel et al. more versatile by giving the controller the capability to import experimental data generated by a separate, non-integrated system, as taught by Daft.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan A. Jarrett whose telephone number is (571) 272-3742. The examiner can normally be reached on 10:00-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on (571) 272-3749. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan A. Jarrett
Examiner
Art Unit 2125

4/22/05

LEO PICARD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100